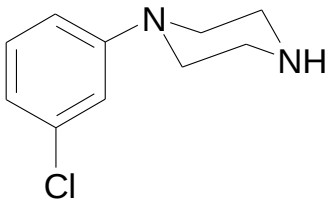
ANALYTICAL SPECIFICATION FORM

Analyte Name and Structure – mCPP

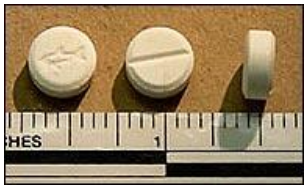


Synonyms:meta-chlorphenylpiperazine, 1-(3-Chlorophenyl)Piperazine

Relevant Physicochemical Data

MW: 196.68
Formula: $C_{10}H_{13}ClN_2$
Chemical Name: 1-(3-chlorophenyl)piperazine
Solubility: Soluble to 100 mM in water
Appearance: Illicit pills, similar to MDMA with custom images.

Images



Test Code Purpose

To complement some related hallucinogenic or party drugs, BZP, and TFMPP, and to add to the hallucinogen panel.

General Relevancy

mCPP is a pharmacologically active metabolite of trazodone, nefazodone, etoperidone and mepiprazole and is often encountered in illicit tablets sold as ecstasy (commonly referred to as ecstasy mimic tablets). Reported concentration of mCPP in these tablets range from 2 – 357 mg/tablet[1,2]. Tablets may contain only mCPP or may be mixed with other drugs such as MDMA, TFMPP or caffeine. mCPP has similar subjective stimulant and hallucinogenic effects as MDMA, but unlike MDMA has not been found to increase blood pressure or heart rate[3].

Mechanism of Action

mCPP has both pre- and post-synaptic effects on the serotonin system[1]. It induces release of serotonin via the serotonin transporter. It acts as an agonist at the 5HT2C receptor and an antagonist at 5HT2B receptor[4]. Unlike MDMA, mCPP has minimum effects on the dopamine system and therefore does not display reinforcing effects seen with MDMA[1].

Adverse Effects

Reported adverse effects of mCPP include nausea, vomiting, dizziness, sweating, induction of migraine-like headache, anxiety, depressive symptoms, and paranoia[4-6].

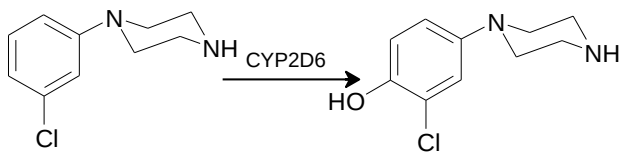
Symptoms of a woman admitted to the hospital after taking 90.9 mg of mCPP included nausea, drowsiness, anxiety, agitation, and visual hallucinations[7]. In addition the patient reported feeling very hot although her body temperature was normal.

Metabolism and Pharmacokinetics

There is large interindividual variation in the pharmacokinetic properties of mCPP[8]. The pharmacokinetic parameters of mCPP in 12 healthy men receiving 0.08 mg/kg intravenous mCPP or 0.4 mg/kg oral mCPP are summarized below:

Parameter	IV infusion mean ± SD (range)	Oral administration mean ± SD, (range)
AUC (ng h/mL)	217 ± 88 (71–362)	454 ± 411 (102–1236)
V (L/kg)	2.65 ± 0.7 (1.73–3.92)	2.65 ± 0.9 (0.86–4.07)
C_{max} (ng/mL)	31.4 ± 8.5 (19.7–45.2)	53.0 ± 35.0 (12.9–104.6)
$t_{1/2}$(h)	4.7 ± 1.6 (2.4–6.8)	4.2 ± 1.3 (2.6–6.1)
t_{max}(h)	n/a	2.19 ± 0.70 (1.40–4.08)
Absolute bioavailability	0.39 ± 0.3 (0.12–0.84)	
Mean absorption time (h)	0.6 ± 0.37 (0.08–1.56)	
Absorption half-life (h)	0.41 ± 0.30 (0.05–1.08)	

MCPP is hydroxylated to p-hydroxy-mCPP (OH-mCPP) and followed by phase II metabolism to glucuronide and sulfate conjugates[9]. The hydroxylation is catalyzed by CYP2D6 and the degree of hydroxylation can be significantly increased or decreased with CYP2D6 inhibitors or inducers.



Minor metabolites, resulting from the degradation of the piperazine ring, include N-(3-chlorophenyl) ehthylenediamine, 3-chloroaniline, hydroxy-3-chloroaniline and their acetylated derivatives[6]. OH-mCPP is the main urinary metabolite; no parent drug is excreted in urine.

Analytes to be Determined

Blood, serum/plasma: MCPP, OH-mCPP (if standard can be obtained)
Urine: OH-mCPP (if standard can be obtained)

To differentiate between licit use of trazodone, nefazodone, etoperidone and mepiprazole and illicit use of mCPP it will be necessary to test for the prescription products and their metabolites in addition to mCPP.

Critical Concentrations

Following a 0.4 mg/kg oral mCPP dose (equivalent to a 28 mg dose to a 70 kg man), peak plasma mCPP concentrations were 12.9–104.6 (mean=53.0 ± 35.0) ng/mL. Similar results were seen follow a 0.5 mg/kg dose (35 mg/70 kg) [10]. A mean peak mCPP plasma concentration of 32.3 ± 17 ng/mL was achieved. In comparison, a mean plasma mCPP concentration of 78 ± 31 ng/mL was achieved 12 h after a 150-300 mg dose of trazodone[11].

In a woman reported to have taken 3 tablets containing 30.3 mg mCPP/tablet (total dose = 90.9 mg) had a plasma mCPP concentration of 320 ng/mL[7].

The recommended analytical range would be 5 to 1000ng/mL

Stability Data

No information on the stability of mCPP in biological samples is available. Tocris Biosciences recommends storing mCPP powder tightly sealed at RT for up to 6 months and mCPP solutions for up to 1 month at –20C[12].

Proper Specimen Types

Blood, serum/plasma, urine. Tissues and other fluids as special requests.

Collection Tubes

No special collection required.

Source of Standards

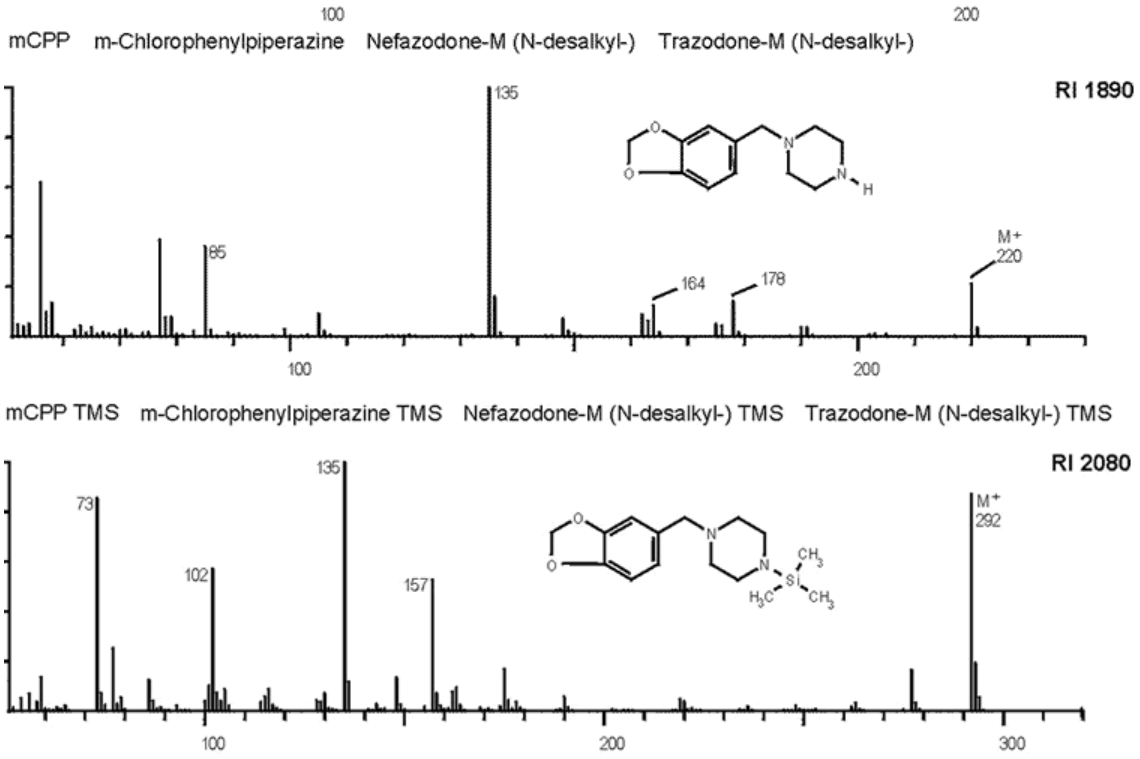
mCPP is available from Cerilliant. MCPP and a deuterated internal standard are available from Toronto Research Chemicals.

Methods of Analysis

Method is currently being developed in the GCMS department.

There is no screening test for mCPP in tablets. These are mass spectra of mCPP and it's TMS derivative (note: mass spectrometry cannot differentiate between mCPP and its isomers oCPP and pCPP):

Sources



Source: Maurer, HH., Mass Spectra of Select Benzyl- and Phenyl- piperazine Designer Drugs. Microgram Journal 2004, 2 (1-4), 22-6.

Interfering Substances

Regular interference mix plus other piperazines such as BZP, TFMPP, MEOPP, MDBP.

Concentration Range

Concentrations should be accurately determined within a range that includes 5 – 500 ng/mL.

Maximum Acceptable Error

The interpretation of concentrations in biological specimens is facilitated by analytical methods with <20% total error.

References

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